

IN THE CLAIMS

What is claimed is:

1 1. A method of forming a microelectronic structure comprising:
2 forming and patterning a deep uv resist layer on a substrate; and
3 etching the substrate in a plasma generated from a gas comprising a
4 carbon to fluorine ratio from about 1:1 to about 2:3 to form substantially
5 vertical sidewalls in the deep uv resist layer.

1 2. The method of claim 1 wherein forming and patterning the deep uv
2 resist layer comprises forming a deep uv resist layer and exposing at least a
3 portion of the deep uv resist layer to a light with a wavelength of about 200
4 nanometers or less.

1 3. The method of claim 1 wherein etching the deep uv resist layer and
2 the substrate in the plasma to form substantially vertical sidewalls comprises
3 etching the substrate in the plasma to form a polymer on the sidewalls of the
4 deep uv resist layer that substantially prevents the deep uv resist layer from
5 being etched.

1 4. The method of claim 1 wherein forming the deep uv resist layer

2 comprises forming the deep uv resist layer wherein the deep uv resist layer
3 comprises a pre-etch sidewall angle that is substantially the same as a post
4 etch sidewall angle.

1 5. The method of claim 1 further comprising etching the substrate in a
2 plasma generated from a gas comprising C_4F_6 , and a pressure from about
3 15 to about 100 millitorr.

1 6. The method of claim 5 further comprising etching the substrate with a
2 power from about 1000 to about 4000 Watts, a C_4F_6 gas flow from about 10
3 to about 50 sccm, an argon flow from about 100 to about 1000 sccm, and a
4 nitrogen flow from about 50 to 100 sccm.

1 7. The method of claim 1 wherein forming and patterning the deep uv
2 resist layer on a substrate comprises forming a deep uv resist layer on a
3 sacrificial light absorbing layer disposed on a dielectric layer.

1 8. The method of claim 7 wherein etching the sacrificial light absorbing
2 layer disposed on the dielectric layer in a plasma generated from a gas
3 comprising a carbon to fluorine ratio from about 1:1 to about 2:3 comprises:

4 substantially etching the sacrificial light absorbing layer and then
5 substantially etching the underlying dielectric layer by utilizing a plasma
6 generated from a gas comprising C_4F_6 .

1 9. The method of claim 8 further comprising substantially etching the
2 sacrificial light absorbing layer and then substantially etching the underlying
3 dielectric layer in a pressure from about 15 to about 100 millitorr and a power
4 from about 1000 to about 4000 Watts.

1 10. The method of claim 8 further comprising substantially etching the
2 sacrificial light absorbing layer and then substantially etching the underlying
3 dielectric layer in a C_4F_6 gas flow from about 10 to about 50 sccm, an argon
4 flow from about 100 to about 1000 sccm, and a nitrogen flow from about 50
5 to 100 sccm.

1 11. The method of claim 1 wherein etching the substrate in the plasma to
2 form a substantially vertical sidewall in the deep uv resist layer comprises
3 etching the substrate in the plasma to form a sidewall angle that is between
4 about 86 and about 90 degrees.

1 12. The method of claim 1 wherein forming and patterning the deep uv

2 resist layer on a substrate comprises forming and patterning the deep uv
 3 resist layer on a substrate, wherein the deep uv resist layer comprises an
 4 acrylic polymer.

1 13. A method of forming a microelectronic structure comprising:
 2 forming and patterning a deep uv resist layer on a sacrificial light
 3 absorbing layer disposed on a dielectric layer; and
 4 etching the sacrificial light absorbing layer and the dielectric layer in a
 5 plasma generated from a gas comprising a carbon to fluorine ratio that is
 6 between about 1:1 to about 2:3, at an etch rate from about 80 to about 120
 7 times faster than the etch rate of the deep uv resist layer in the plasma.

1 14. The method of claim 13 further comprising etching the sacrificial light
 2 absorbing layer and the dielectric layer in a plasma generated from a gas
 3 comprising C₄F₆.

1 15. The method of claim 14 further comprising etching the sacrificial
 2 light absorbing layer in a pressure from about 40 to about 60 millitorr, and
 3 then etching the dielectric layer in a pressure from about 80 to about 120
 4 millitorr.

1 16. The method of claim 15 further comprising:

2 etching the sacrificial light absorbing layer in a C_4F_6 gas flow
3 from about 14 to about 20 sccm, an argon flow from about 300 to about 500
4 sccm, and a nitrogen flow from about 200 to 400 sccm; and

5 etching the dielectric layer in a C_4F_6 gas flow from about 10 to
6 about 14 sccm, an argon flow from about 280 to about 350 sccm, and
7 a nitrogen flow from about 25 to 40 sccm.

1 17. A method of forming a microelectronic structure comprising:
2 forming a deep uv resist layer on a sacrificial light absorbing layer that
3 is disposed on a dielectric layer;

4 patterning a portion of the sacrificial light absorbing layer to define a
5 trench;

6 forming a bottom width of the trench, wherein the ratio of the bottom
7 width to a top width of the trench is about 1:1 by:

8 etching the sacrificial light absorbing layer in a plasma
9 generated from a gas comprising a carbon to fluorine ratio that is
10 between about 1:1 to about 2:3; and

11 etching the dielectric layer in a plasma generated from a gas
12 comprising a carbon to fluorine ratio that is between about 1:1 to
13 about 2:3.

1 18. The method of claim 17 wherein etching the sacrificial light absorbing

2 layer in a plasma generated from a gas comprising a carbon to fluorine ratio
3 that is between about 1:1 to about 2:3, comprises etching the sacrificial light
4 absorbing layer in a plasma generated from a gas comprising C_4F_6 ,

1 19. The method of claim 18 further comprising etching the sacrificial light
2 absorbing layer in a pressure from about 40 to about 60 millitorr and a power
3 from about 1000 to about 4000 Watts,

1 20. The method of claim 19 further comprising etching the sacrificial light
2 absorbing material in a C_4F_6 gas flow from about 10 to about 20 sccm, an
3 argon flow from about 400 to about 500 sccm, and a nitrogen flow from
4 about 200 to about 400 sccm.

1 21. The method of claim 17 wherein etching the dielectric layer in a
2 plasma generated from a gas comprising a carbon to fluorine ratio gas that is
3 between about 1:1 to about 2:3 comprises etching the dielectric layer in a
4 plasma generated from a gas comprising C_4F_6 , a pressure from about 90 to
5 about 110 millitorr, a C_4F_6 gas flow from about 10 to about 15 sccm, an
6 argon flow from about 250 to about 350 sccm and a nitrogen flow from about
7 20 to about 50 sccm.

1 22. An intermediate product comprising:

2 a trench in a substrate, wherein a deep uv resist layer is disposed on
3 a first surface of the trench, and wherein the deep uv resist layer comprises
4 a sidewall that is substantially vertical and comprises a polymer on the
5 sidewall; and
6 a bottom width of the trench wherein the ratio of the bottom width to a
7 top width of the trench is about 1:1.

1 23. The intermediate product of claim 22 wherein the deep uv resist layer
2 comprises a sidewall angle that is from about 85 to about 90 degrees.

1 24. The intermediate product of claim 22 wherein the bottom width of the
2 trench is from about 80 to about 90 nm.

1 25. The intermediate product of claim 22 wherein the deep uv resist layer
2 is between about 2,100 to about 3,000 angstroms in thickness.

1 26. The intermediate product of claim 22 further comprising a trench
2 sidewall, wherein the trench sidewall comprises has a low k dielectric layer
3 that comprises a dielectric constant below about 4.

1 27. The intermediate product of claim 22 wherein the low k dielectric layer
2 comprises a material selected from the group consisting of carbon doped

3 oxide, organic polymers such as a polyimide, parylene, polyarylether,
4 organo-silicone, polynaphthalene, polyquinoline, or copolymers thereof, spin
5 on glass materials, either doped or undoped, and porous materials such as
6 xerogels and others that include templated pores.

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